Monitoring Docker Containers

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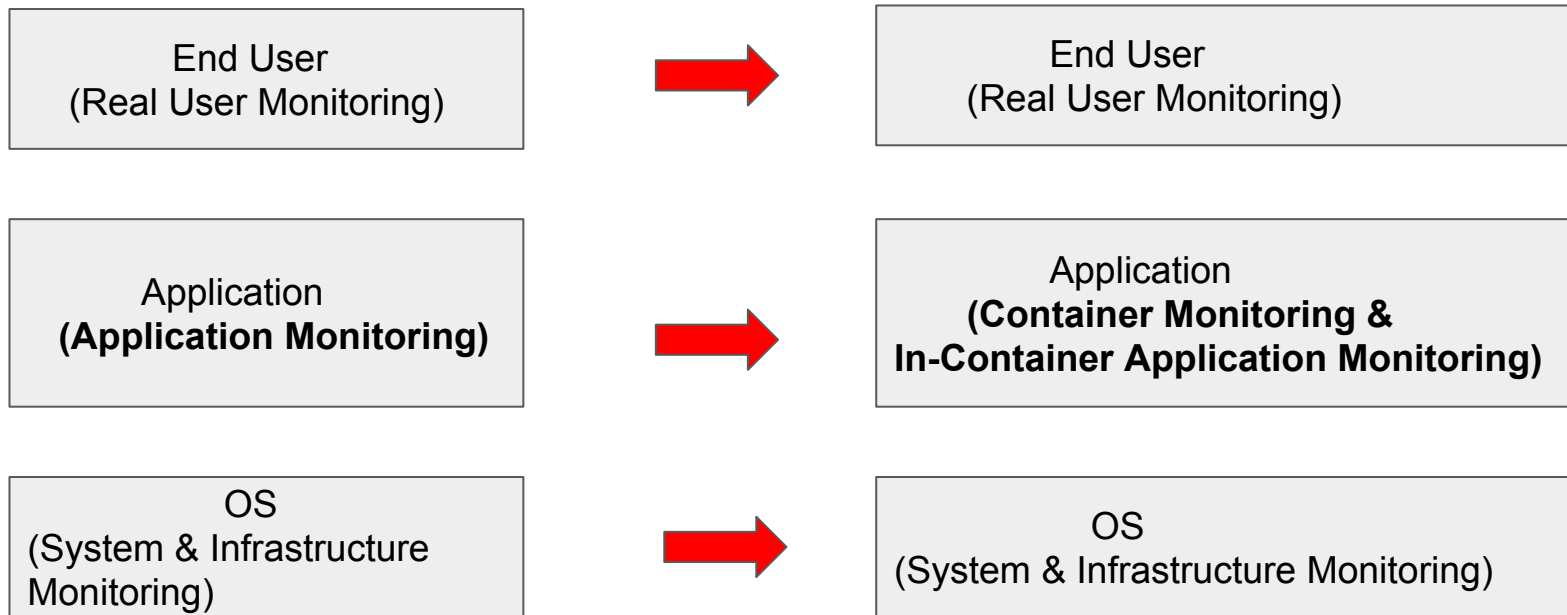Abhinav Ashish
Sudhanshi Jain

Challenges in Container Monitoring

Containers reside between infrastructure and application, making it difficult to monitor using existing tools in the industry.
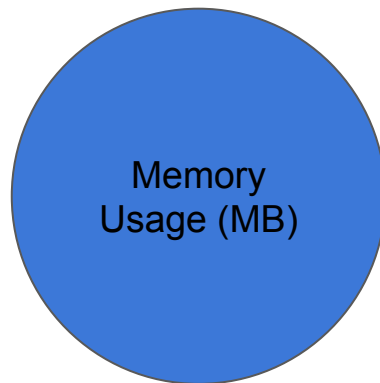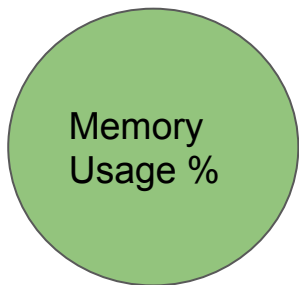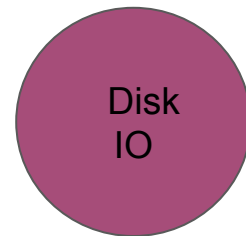
Containers are spawned and destroyed very quickly. (as fast as git commits)

Multiplication of containers combined with dynamic lives leads to metric burst

Change in Monitoring Landscape

End User (Real User Monitoring)	End User (Real User Monitoring)

Application **(Application Monitoring)**	Application **(Container Monitoring & In-Container Application Monitoring)**

OS (System & Infrastructure Monitoring)	OS (System & Infrastructure Monitoring)

Interesting metrics to monitor
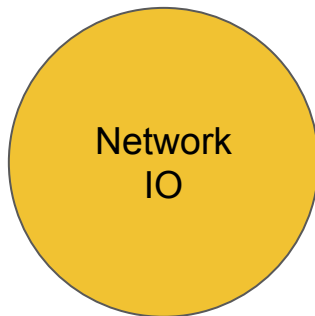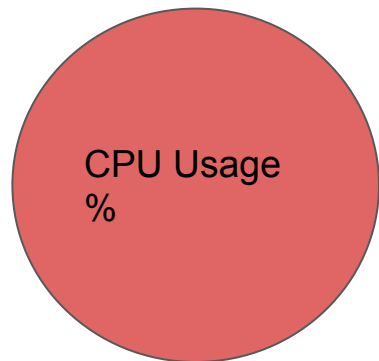
Some tools to monitor dockers

- Docker Stats
- Docker Remote API
- cAdvisor
- ...

Docker Stats

Displays a live stream of the following container(s) resource usage statistics:

- CPU % usage
- Memory usage, limit, % usage
- Network i/o
- Disk i/o

Docker Stats

Stats for all containers on the host

```
CONTAINER          CPU %        MEM USAGE / LIMIT      MEM %       NET I/O              BLOCK I/O          PIDS
0cec668a7464       0.02%        6.242MiB / 7.684GiB    0.08%       5.92kB / 14.1kB      0B / 0B            6
f8d0bba23dcf       0.03%        5.941MiB / 7.684GiB    0.08%       4.71kB / 0B          0B / 0B            6
```

Stats for a particular container by ID

```
CONTAINER          CPU %        MEM USAGE / LIMIT      MEM %       NET I/O              BLOCK I/O          PIDS
f8d0bba23dcf       0.02%        5.941MiB / 7.684GiB    0.08%       4.92kB / 0B          0B / 0B            6
^C
jkjabbal@jkjabbal-Inspiron-13-7359:~/Documents/CSC547$ docker stats f8d0bba23dcf
```

Docker Remote API

Docker daemon provides a Remote Rest API.

This API is used by the client to communicate with the engine.

This API can be invoked by curl or POSTMAN.

```
"cpu_stats":{ ⊟
    "cpu_usage":{ ⊟
        "total_usage":93497033,
        "percpu_usage":[ ⊟
            27673953,
            17416585,
            44248536,
            4157959
        ],
        "usage_in_kernelmode":40000000,
        "usage_in_usermode":30000000
    },
    "system_cpu_usage":90444540000000,
    "online_cpus":4,
    "throttling_data":{ ⊟
        "periods":0,
        "throttled_periods":0,
        "throttled_time":0
    }
},
"precpu_stats":{ ⊟
    "cpu_usage":{ ⊟
        "total_usage":93253164,
        "percpu_usage":[ ⊟
            27430084,
            17416585,
            44248536,
            4157959
        ],
        "usage_in_kernelmode":40000000,
        "usage_in_usermode":30000000
    },
    "system_cpu_usage":90440550000000,
    "online_cpus":4,
    "throttling_data":{ ⊟
        "periods":0,
```

cAdvisor

cAdvisor or Container Advisor provide host and container metrics.

It is a running daemon that collects, aggregates, processes, and exports information about running containers.

cAdvisor dashboard shows data for the last 60 seconds only. However multiple backends, such as Prometheus and InfluxDB, are supported that allows long term storage, retrieval and analysis.

Command to run cAdvisor

```
jkjabbal@jkjabbal-Inspiron-13-7359:~/Documents/CSC547$ sudo docker run \
> -volume=/var/run:/var/run:rw \
> -volume=/sys:/sys:ro \
> —volume=/var/lib/docker/:/var/lib/docker:ro \
> —publish=8080:8080 \
> —detach=true \
> —name=cadvisor \
> google/cadvisor:latest
```

cAdvisor UI
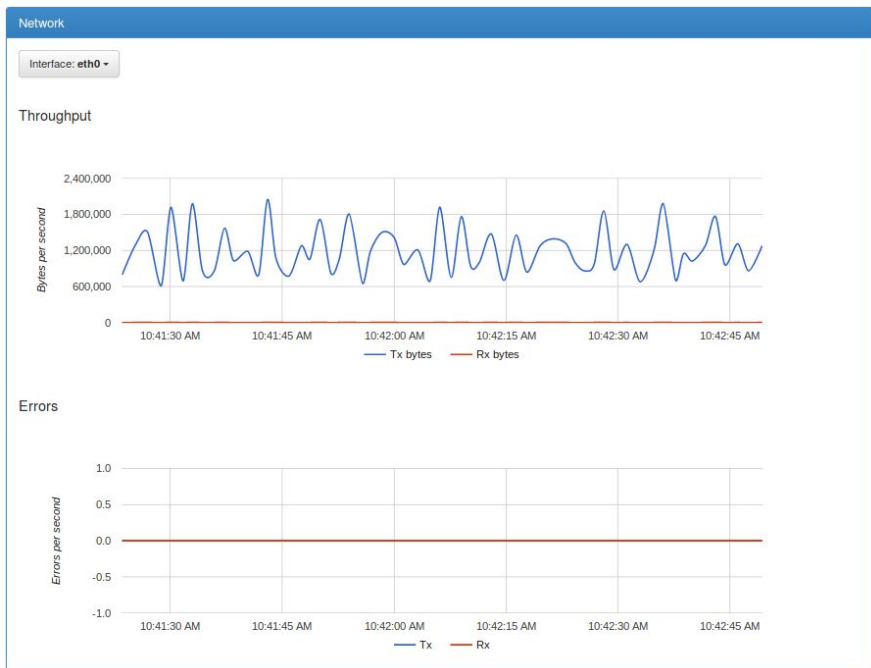
Comparison

Docker Stats	Docker Remote API	cAdvisor
CLI	CLI	GUI
Returns output in console	Returns JSON object	Displays graphical data
Can be container specific	Always needs container ID	
Simple but limited functionality	Application friendly, JSON object usage	Intuitive UI

Alternatives

- Docker Universal Control Plane
- Sysdig Cloud
- Docker-Scout
- Data Dog
- Ruxit
- NewRelic
- Logentries

THANK YOU